Studies on Person Perception (1) : The Relationship of Cognitive Complexity to the Social Interaction

STUDIES ON PERSON PERCEPTION (I): THE RELATIONSHIP OF COGNITIVE COMPLEXITY TO THE SOCIAL INTERACTION

By

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It is the purpose of this paper to point out that cognition changes in accordance with the intimacy with the person. In order to investigate the relationship, an experiment was performed. Three aspects of cognitive complexity (dimensionality, articulation, and integration) were measured by Bieri's modified RCRT, Crockett's dimensionality, and Ware's component analysis method. These tests were performed on condition of changing the intimacy with stimulus person, i.e., one-way interaction (rating of photo), face-to-face interaction (rating after actual interaction), and frequent interaction (rating of aquaintance). Consequently, the value of cognitive complexity changed within the subject taking the shape of V curve, as the intimacy increased. In addition, these measures' validity was discussed in relation to the amount of evaluative contrary included in rating scales.

INTRODUCTION

In the research of person perception, the problem of cognitive style has been regarded as important as that of stimulus person and of situation. Particularly, there have been many discussions about individual difference of cognitive structure. One of the representative studies with regard to this problem is the research for cognitive complexity (c.f., Bieri, 1955, 1966; Crockett, 1965, etc.).

The concept of cognitive complexity is based on Personal Construct Theory (Kelly, 1955). The theory will not be discussed here since there exist many books which have dealt with this in detail (c.f., Bannister & Mair, 1968; Bannister, 1970, 1977).

Cognitive complexity was proposed by Bieri (1955). He defined it by stating as follows: "We will deal most extensively with the concept of cognitive complexity-simplicity, which is concerned with the relative degree of differentiation of the person's construct system (Bieri, 1966, 13p)."

On the other hand, Crockett, W.H. described, ".... the complexity of given cognitive system is not judged in absolute terms, but by comparison with the degree of complexity of other cognitive systems. An interpersonal cognitive system will be relatively complex if it contains a large number of interpersonal constructs, and if these constructs are hierarchically integrated to a relatively high degree. We shall regard the relative number of constructs in a cognitive system as its degree of cognitive differentiation (Crockett, 1965).

The term "construct" does not mean in a usual sense but implies Kelly's original concept, that means something like transparent patterns or templets through which a person looks at his world. It is the only component of cognitive structure and the channels in which one's mental processes run. It is also a way in which some things are construed as being alike and yet different from others (c.f., Kelly, 1955). Roughly speaking, it can be dealt with an bipolar adjective scale.

Besides, Scott (1969) proposed a model of cognitive space with the measures of its properties. In his paper, he reports the concepts such as dimensionality, articulation, centrality, and integration. "Dimensionality is defined as the number of 'dimension-worth' of space utilized by the attributes with which a person comprehends the domain. The articulation of an attributes is defined as the number of reliable distinctions among objects that a person makes on the attribute. . . Centrality may be represented as the proportion of images that have explicit projections on the attributes. . . Integration refers to the manner in which images are related (Scott, 1969)."

In the present investigation, the author deals with cognitive complexity from three aspects. Cognitive complexity implies a degree of differentiation of one's own cognitive structure (construct system). "Differentiation" consists of both "dimesionality" as the number of cognitive dimensions (constructs), and "articulation" as the number of articles of each dimension. "Integration" is the degree of hierarchical integration of dimensions. These aspects of cognitive structure are independent but closely related to each other. Let us discuss these concepts and their measures in the next section.

PURPOSE

The purpose of this paper is to point ot that one's cognition changes in accordance with the intimacy with stimulus person, and to investigate the validity of some cognitive complexity measures.

Hypothesis about the relation between cognitive complexity and the intimacy: For this problem, Supnick (1964) devised an interesting experiment (see Crockett 1965). The Ss were required to describe the impression of eight persons' who were chosen by the combination of three factors, i.e., Age (Older-Peer) × Sex (Male-Female) × Likability (Like-Dislike). Using the number of dispositional terms which appeared in his descriptions as complexity measure (Crockett, 1965), Supnick concluded that we were more complex with respect to those others with whom we had associate most often (frequency of interaction hypothesis).

On the other hand, Miller (1969) opposed this hypothesis. He devised two experimental interaction settings. In the personoriented interaction setting, the subject talked with the partner (E's confederate) about the topics of psychology (their speciality) and of vacation. In the task-oriented interaction they talk with about the strategies to learn the alphabet for the deaf. By varying the amount of information about partner, he compared complexity value of two settings, and reported that

there was no difference between them.   From my point of view, this conclusion seems to be interpreted like this: It suggests that it is not the quality but the period of interaction to affect one's cognition.

In this paper, the author hypothesizes the concept of "the degree of intimacy" which implies both the intimacy and the period of interaction.   This concept is based on the development of interpersonal relationship (Levinger & Snoek, 1972).   In the light of their research, the author divided the intimacy into four degrees as follows (in dyad situation).

No interaction (spacial proximity).

The 1st Degree (one-way interaction); such as rating an unknown person by his picture.

The 2nd Degree (formal interaction); there exists an actual interaction between the two, who are unfamiliar with each other.

The 3rd Degree (informal interaction); there exists actual interaction between the two, who are on good (bad) terms over a long periods.

The relation between the intimacy and cognitive complexity is hypothesized as follows.   At the 1st degree, as informations about a stimulus person (Sp) are limited, a stereotyped impression which importantly depends on one's cognitive structure will be made.   So cognitive complexity will influence the complexity of impression.   And it seems to be hypothesized that apparent features will be more useful as the cue than dispositional ones in this impression formation process.

There are many situations in the 2nd degree from the first interaction to the formal interaction.   As there is no clear point which discriminates between the 2nd and the 3rd degree, let us consider the first interaction situation as the 2nd degree.   Under the situation, many informations which are of doubtful accuracy are transmitted to us, so we shall constitute our impressions by several main dimensions and break off interpretation by other dimensions.   Consequently, the impression will become relatively simple, and our complexity won't reflect in it.   The longer and the more intimately we keep company with the person, the more complex his impression will become.   And at the 3rd degree, we make up a fixed complex image of the person, and come to describe him in dispositional features.

The hypotheses may be simply summarized as follows:

(1)   The value of cognitive complexity changes within the subject taking the shape of V curve, according as the intimacy increases.

(2)   The cue used to describe others changes from the apparent feature to the dispositional one according as the intimacy increases.

Considerations about several measures of cognitive complexity: The second purpose of this paper is to investigate the validity of several cognitive complexity measures. There are many measures in regard to cognitive complexity.   For example, Bonarius, (1965) reviewed them in detail.   In addition, many researches deal with the problem

as Carr (1965), Vannoy (1965), Mehrabian (1968), Scott (1969), Adams-Webber (1970), Smith & Leach (1972), Metcalf (1974), Seaman & Koenig (1974), Gibson (1975), etc. In this report the author deals with three measures.

(*Bieri method*): The first measure is Bieri's method (Bieri, 1966). The Ss rate 10 Role Persons such as mother, a person you dislike, etc., on 10 pairs of adjective scales (provided constructs). In this measure, the exact agreements of the rating of each construct (scale) with the rating of every other constructs are culculated. A high score means cognitive simple, because it indicates the similarity of rating for every Role.

We can interpret the measure from the context of information theory. It measures an average of the minimum number of constructs that the subject needs to rate a stimulus person. So it can be regarded as the measure of dimensionality. We can also caluculate the score by statistical H.

When a comparison is made between one Role and all other Roles, the score indicates an average of the minimum number of categories which the subject uses on each scale. The score is regarded as articulation score.

(*Ware method*): As the second measure, the author uses the percentage of variance accounted for by the first principal components factor which is gotten from the factor analysis of the correlations between constructs (Ware, E.E., 1958; see Reker, 1974). It is used for the measure of integration, which indicates the degree of inter-dependent relation among constructs. This measure correlates high with Scott's "$D1$", which correlates with Bannister's "D" (c.f., Honess, 1976; Ōbuchi & Horike, 1977).

(*Crockett method*): The third measure is the Crockett method. As described before, the method uses the number of dispositional terms which appear in free descriptions. The more terms there appear, the higher is the complexity. In reports of this method, it has been dealt with as the measure of dimensionality. But some papers reported no significant correlation between Bieri's dimensionality and this one (ex., Miller, 1969). Other factors such as verbal intelligence might have an influence on the measure.

(*Some questions about these measures*): In Bieri method, the choice of Role Persons and constructs seems to affect the score. Some researches report the influence of the evaluation of Role Persons to the score (ex., Miller & Bieri, 1965), others report the originality of the rating on family Role (ex., Kuusinen & Nystedt, 1975). In this report the author deals with the problem by means of varying the amount of evaluative contrary included in rating scales (constructs). The amount of evaluative contrary implies the difference of socical desirability between two adjectives which compose both ends of each scale.

There are two hypotheses about the difference of the cognition for a positively evaluated person and for a negatively evaluated person. The interaction frequency hypothesis (Supnick, 1964) has insisted that the cognition for a positively evaluated person is more defferential than that for a negatively evaluated person. The vigilance

hypothesis (Miller & Bieri, 1965; Irwin, Bieri & Tripodi, 1967) has insisted on the opposite result. We shall compare these hypotheses in this paper.

The other problem about Bieri method is the difference between "elicited constructs" and "provided constructs". In original Kelly method, the S elicit his construct from the comparison of three persons. These constructs are called elicited constructs. Tirpodi & Bieri (1963) used constructs provided by experimenter besides them and reported no difference between the two. But there are several papers which report the difference (Kuusinen & Nystedt, 1972).

The author considers the problem again from the view point of the amount of evaluative contrary included in the rating scales.

In addition, the validity of Crockett method is discussed.

Method

Preparation: For the classifying of free descriptions, the author made a content category table (Table 1). Categories depend on Beach & Weltheimer, (1961), and Livesley & Bromley, (1973). The term classified into category I, II, (1–4), is regarded as the apparent cue.

Besides, an experiment was performed. 40 Ss were required to write as many adjectives they could fitting for 10 Role Persons. After that, they rate these adjectives on a 7-points social desirability scale. The total number of adjectives were 1685. These results were used for making provided constructs.

Procedure 1: The Ss were 41 male students.

(1) The Ss were required to rate six stimulus persons (color-slide) on a 5-points liking

Table 1. Content categories used for classifying
free descriptions.

I. Objective information
1. Appearance of object
2. General information
II. S's judgement about O's appearance
3. Judgement about O's appearance
4. Inference from apparent cue
III. Social interaction
5. Interaction between S. and O
6. Interaction between O. and others
IV. Personal characteristics and behavioral consistencies
7. O's personality
8. O's behavioral consistency
V. Preference, Evaluation
9. Preference and evaluation of O
VI. Social factors
10. O's social environment
VII. Comparison
11. Comparisons between O. and S. (or others)
IX. Residue

scale. Stimulus persons were male graduate students of the psychological course, unknown for the *S*s. Each picture was a full-faced, upper half figure. The background was a gray wall. They were freely dressed, and kept their faces straight as usual.

(2) The *S*s chose three persons among six. One was the most favourable person, the other two were the most unfavourable person and the neutral. In addition, experimenter provided five Role Persons as follows: (a) a friend of the same sex as yourself whom you like, (b) a friend of the same sex whom you dislike, (c) a friend of the same sex whom you often talk with, (d) a friend of the opposite sex whom you like, (e) your mother. The *S*s chose them (a~d) from their usual friends. *E* required the *S*s to describe these eight persons' images (Three pictures+five Role Persons). Three minutes were allowed for each description.

According to the preceding content categories, *E* classified them. And then, *E* selected a dispositional term which appeared first in each description as one end of a scale (construct pole).

(3) In addition to the preceding Role Persons, five Roles were provided as follows: (f) The person whom you would most like to help, (g) a person whom you usually feel most uncomfrotable, (h) your teacher, (i) a person with whom you had been associated who appeared to dislike you, (j) your father. Again the *S*s chose them from their usual acquaintance and rated them on 7-points SD scales. Each rating scale has "construct pole" at the left end which was mentioned before, and "contrast pole" at the right end which the *S*s thought as an opposite meaning of construct pole. These scales (constructs) are regarded as "elicited constructs".

A few comment will be made on the results of procedure 1. Stimulus persons were equally selected and rated (the number of selected times=14–26 times/ one person, rating average=0.22 ~–0.29).

Dispositional terms which were selected frequently as construct pole are, for example, serious (13 times/41 persons), tender minded (9/41), frank (5/41), severe (5/41), etc. *E* related these results with aforesaid social desirability ratings, and decided twelve "provided constructs" as in Table 2. Six constructs (pairs of adjectives) included a large amount of evaluative contrary (named *E*-constrcut ···· the difference of disirability rating between two adjectives was over 3 points). And other six constructs

Table 2.   12 pairs of adjectives used as provided construct

E-constructs	*NE*-constructs
Serious - Unserious	Progressive - Conservative
Tender-minded - Hurt a person	Inattentive - Woory onesel
Gentle - Insidious	Uurbanized - Unaffected
Harhmonious - Selfish	Talkaitive - Taciturn
Cheerful - Gloomy	Impudent - Weak-kneed
Likable - Dislike	Indulgent - Severe

included a small amount of evaluative contrary (named *NE*-construct .... the rating difference was within 1 point).

Procedure 2: The *S*s were 18 male students, who participated in procedure 1.

(1)   The *S*s were devided in some groups and severally required to rate six persons (color-slides) on provided constructs. Time of presentation was five seconds for one *Sp*.

(2)   Then, the actual face-to-face interaction between *S*s and *Sp*s was intended. An instruction as follows gave to the *S*s.: "We want you to meet these persons. They are graduate students of the psychological course. When they meet you, they will ask some questions. You must answer them by the number of item. 1. 'I think so.' 2. 'Sometimes I think so.', and 3. I don't think so....."

After then, several Sps (2–4) were entering into the room. They wore a white over-all, and kept their faces straight as usual. They sat face-to-face with the *S*s, and began to question in turn. Three questions which had been selected from EPPS questionnaire assigned for each *Sp*. The *S*s answered them, but couldn't ask any questions to the *Sp*s. When all questions were answered, *Sp*s went out of the room.

(3)   After the interaction, the *S*s were required to describe *Sp*s' impression within two minutes. Next, they rated them on provided constructs.

(4)   In the next place, the *S*s rated 10 Role Persons as mentioned before on provided constructs.

(5)   Finally, in regard to some Role Persons (a, b, c, d, f, g), the *S*s supposed that they were drunk, and rated their character at the time on provided constructs. Only at this session 17 subjects who had participated in procedure 1 were added to the *S*s 35 in total.

In relation to the concept of the intimacy, the procedure is summarized in Table 3.

Table 3.   The experimental design

The degree of intimacy	Stimulus persons	Method (construct)		Score	Procedure
1	Pictures (color-slides)	Free-description		F1	1-(2)
		RCRT (provided)		D1	2-(1)
2	Actual persons (the same as the picture)	Free-description		F2	2-(3)
		RCRT (provided)		D2	2-(3)
3	Role Persons	Free-description		F3	1-(2)
		RCRT	(elicited)	E3	1-(3)
			(provided)	D3	2-(4)
3'	Role Persons (when they were drunk)	RCRT (provided)		D3'	2-(5)

From these procedures, we can gain five matrices (row is Role Persons and column is constructs), named D1, D2, E3, D3, D3'.   For each matrix three measures mentioned as before can be calculated, i.e., BD (Bieri's dimensionality), BA (Bieri's articulation), FI (the first factor of principal component analysis .. integration). BD and BA was culculated by approximation of statistical H.   In addition, we can gain three groups of free descriptions, named F1, F2, F3, which are classified into the categories as before.   And for each subject in every group, Crockett's dimensionality (CD) can be calculated.

<div align="center">RESULTS</div>

The relation between the degree of intimacy and cognitive complexity is shown in Table 4.   Each cell is an average of 18 subject's complexity values.   In BD, BA, CD, high score means cogitire complex, and in FI, it means cognitire simple.   The values of D2 are less than D1 or D3, and the values of D1 are less than D3.   Accordingly, we can say that our considerations in the hypothesizing process are approximately correct.

Table 4.   The relationship of congitive complexity to the degree
of the intimacy (the average between Ss.).

Method			$\bar{x}$	SD	t	r
Bieri method (dim.)		D1	67.88	3.61	D2<*D1 D2<*D3	D1-D2 .35 D1-D3 .66** D2-D3 .27
		D2	63.57	6.85		
		D3	68.72	5.03		
Ware method		D1	5.95	1.17	D1<D3	D1-D3 .07
		D3	5.49	1.19		
Bieri method (art.)		D1	66.16	6.63	D1<D3	D1-D3 .64**
		D3	69.44	5.07		
Crockett method		F1	14.09	3.60	F1<*F3 F2<*F3	(cf.) Table 9
		F2	14.13	5.06		
		F3	16.72	3.18		

N=18

Figure 1 shows the change of the complexity value (BD) in accordance with the increase of the intimacy from the 1st degree to the 3rd.   It is evident that the score changes taking the shape of V curve as expected in hypothesis I.

Table 5 shows the result of the classification of free descriptions, except F2 which could not get any sufficient sample.   The first column (W) is the number of words which are classified into each category.   The second column (W/T) is W/total number
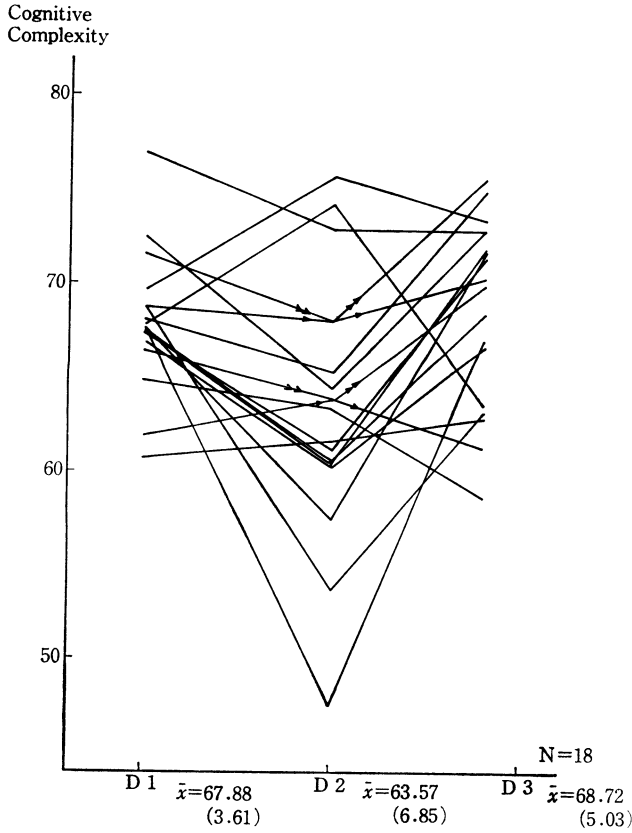
Fig. 1. The relationship of cognitive complexity to the degree of the intimacy (changes of value within subjects).

Table 5. The result of the classification of free descriptions.

Category		I		II		1II		IV		V	VI	VII	Total
		1	2	3	4	5	6	7	8	9	10	11	
F1	W	45	4	72	22	40	3	216	45	94	7	12	560
	W/T	8.0	0.6	12.9	3.9	7.1	0.4	38.6	8.0	16.8	1.3	2.1	
F3	W	5	57	4	0	113	14	226	121	106	11	24	681
	W/T	0.7	8.4	0.6	0	16.6	2.0	33.2	17.8	15.6	1.6	3.6	

N = 41

of words. As is evident from the Table, a proportion of the apparent cue used in cognition (category 1–4) is larger in F1 than in F3. The result supports the hypothesis 2.

In order to investigate the effect of the amount of evaluative contrary included in

the scales (construct), D1, D2, D3 matrces were devided into two groups of E-construct and NE-construct.   And the average of complexity value (BD) was calculated for all six matrices.   Table 6 shows the results.   It is clear that in every case ratings on NE constructs are more differential than those on E-constructs.   The result was interpreted by the response bias (c.f., Deaux, 1975).   Namely it is supposed that the rating on E-constructs may yield more polarization than on NE-constructs.   Consequently, much agreement of rating may be done on E-construct.   This result suggests that we must consider the content of construct when we discuss cognitive complexity especially measured by provided constructs.   Let us discuss the problem again in the next section.

Table 6.   The difference of complexity values obtained
by the rating on E-construct and by
that on NE-construct.

	Construct	
	E	NE
D1	58.3(4.24)	62.3(4.66)
D2	54.7(7.70)	60.8(8.00)
D3	56.8(6.51)	61.9(4.03)

N=18

For the comparison between elicited construct and provided construct, the amounts of evaluative contrary included in elicited construct were examined.   Consequently, 2.4 construsts included relatively large contrary (over 2 points on desirability rating) on an average.   So, NE-provided construct devided into three groups.   The author added E-provided construct to each group of NE-construct, caluculated the complexity value of each combination, and averaged them.   This score was used for comparison as

Table 7.   The comparison of complexity values obtained
by the rating on elicited construct and by that
on provided construct.

	Construct	$\bar{x}$ (SD)	t	r
Bieri method (dim.)	Provided	62.91(5.99)	1.35	.39**
	Elicited	64.84(5.54)		
Ware method	Provided	4.46(0.79)	1.73	.08
	Elicited	4.10(0.90)		
Bieri method (art.)	Provided	69.62(4.30)	1.81	.45**
	Elicited	71.50(4.13)		

N=35

elicited construct score.   Table 7 shows the results.   In every measure the score obtain-
ed by the rating on elicited construct is higher (complex) than the score by the rating
on provided construct, but there are not significant differences between them.   So we
can regard them as approximately equivalent.

To investigate the validity of Crockett method as dimensionality, the correlation
between *CD* and *BD* is calculated for every degree of intimacy (Table 8).   The results
shows a significant correlation in the 2nd degree.

Table 8.   The relation between Bieri's dimensionality
and Crockett's dimensionality.

Bieri's dim.	Crockett's dimensionality		
	F1	F2	F3
D1	.11	.23	.01
D2	.36	.74**	.02
D3	.44**	.41*	.33

N=18

Table 9 shows intercorrelations between Crockett methods.   We can see a high
correlation between the the 1st and the 3rd degree in the same way as the results
shown in the Bieri's dimensionality.

From these results, we conclude that Crockett method is useful for the measure of
the dimensionality.

Table 9.   Intercorrelations of Crockett's
dimensionality.

	F2	F3
F1	.37*	.58**
F2		.20

N=18

DISCUSSION

The results show that our cognition of persons changes in compliance with the
degree of intimacy.   When the information about a stimulus person is limited, a
stereotyped impression seems to be formed.   In a face-to-face situation, the impression
becomes a simple one.   But as interaction goes on, the cognition seems to differentiate.

This is a rough grasp of the relation between cognition and social interaction.   It
is necessary to examine this process in detail.

As shown in Figure 1, the person whose complexity value is mediate in D1, D3,
seems to change his cognition typically as hypothesized.   On the other hand, persons

low in complexity value do not change their cognition so much as the others.   This difference may be an interesting subject for a future study.

The correlation (*BD*) between D1 and D3 is .66.   Accordingly, cognitive complexity measured by *BD* is the relatively stable property of cognitive structure.   But sometimes its consistency seems to be lost owing to a situational factor such as the intimacy.   Table 10 shows the results of rating the same Role Person under the instruction what they would do if they were drunk (P3' score).   In comparison with D3 score, an interesting result was obtained.   Dimensionality doesn't change between them, while on the other hand, articulation and integration change considerably and become simple in D3'.   The result was interpreted like this: the ambiguity of Role Person's behaviour under such a condition led to simplify their image.   It seems to be necessary to insist again on the importance of situational factor affecting cognition.

Table 10.   The change of complexity value when the stimulus
person were set in another situation.

Method		$\bar{x}$ (SD)	t
Bieri method (dim.)	D3	67.97 (5.76)	0.59
	D3'	66.86 (8.77)	
Ware method	D3	5.50 (1.07)	4.47**
	D3'	6.64 (0.94)	
Bieri method (art.)	D3	69.62 (4.22)	4.79**
	D3'	62.32 (6.34)	

N=35

Next, we will consider *BD* measure.   We can conclude that the amount of evaluative contrary affects the complexity values.   In relation to this consequence, my previous experiment shows the results as follows.   In a rating by *E*-construct, the cognition of a negatively evaluated person seems to differentiate.   This result is in agreement with that of vigilance theory (Irwin, et., 1967).   But in the rating on *NE*-construct, the cognition of a positively evaluated person comes to differentiate.   The former result may be interpreted as response bias.   Accordingly, we had better conclude that the cognition of a positively evaluated person differentiated more than that of a negatively evaluated person.

Gibson (1975) reported that the reverse of construct pole results in altering the value of cognitive complexity.   This seems to be caused by the evaluative contrary in constructs.   It is necessary to investigate cognitive complexity by the *NE*-construct in addition to the research by the previous method, because there are many viewpoints free from the evaluation.

Crockett method seems to be able to be used as dimensionality measure in Japan.

The result may be owing to the Japanese which has many dispositional terms.

In order to investigate the correctness of these conclusions we must do a lot of studies in future.

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